

RESULTS OF 1989 WIND RIVER SEDIMENT QUALITY EVALUATION

Project

The Wind River in-lieu Indian fishing site is located on the bank of the Wind River approximately 3/4 mile upstream from its confluence with the Columbia River. At present the site is only partially usable because of shoaling of silt. The facility consists of a boat ramp and a floating dock capable of accommodating up to six boats.

Previous Studies

No previous studies have been conducted in this area.

Present Study

Sediment samples for physical and bulk chemical analyses were collected on June 14, 1989 at the location shown on attachment 1. A total of 3 samples were collected. All samples were taken from between the new boat ramp and the floating dock. Two were labeled WR-C-1&2 (hereinafter called cored samples), and the other was labeled WR-S-1 (hereinafter called surface sample).

The cored samples were collected using transparent acid-rinsed cellulose butyrate acetate core liners. The water depth for samples WR-C-1&2 were respectively 12 inches and 14 inches. The sediment core penetration were 25 inches and 14 inches for the two cored samples respectively. The recovered material was extruded from the core liners and a channel subsample was taken. The surface sample was collected from the top 2 inches at various locations along the wetted portion of the shore.

Material for physical analyses were placed in ziplock freezer bags. Samples for chemical analysis, were placed in 8oz. I-Chem Specialty Cleaned Container with teflon lined lids. All samples were placed in an ice chest with ice and were transported to NPDMT Laboratory for further processing on the same day as sampled.

NPDMT Lab performed the physical analyses of the 3 sediment samples collected. These analyses included grain size, total volatile solids and "Dredge Analysis" which consists of resuspended density, void ratio, percent of volatile solids, and specific gravity, for each of the 3 samples. (see attachment 2)

Chemical analyses for metal and pesticides/PCB's were also performed by the NPDMT Lab. (see attachment 3)

Discussion

Physical data: The material consists primarily of subangular to subround silty sand. The mean grain size for the cored samples respectively were 0.11 and 0.16, and 0.089 of that of the surface sample. The percent fines were 29.9% and 22.8% for samples WR-C-1 and WR-C-2 and 41.3% for sample WR-S-1. The percent volatile solids of the bulk of the material were 6.3% and 5.9% for the two cored samples respectively and 10.6 for the surface sample. Specific gravity for the cored samples was around 2.70 and was 2.60 for the surface sample.

Chemical data: No pesticides/PCB's were detected in the analyses performed by the NPDMT Lab at the detection limits required. Analysis for trace metals also show that all concentrations were below the levels of concern and are indicative of uncontaminated sediments.

Conclusion

The sediments tested during this evaluation are considered representative of the project sediments to be dredged. The bulk of the material to be dredged can be classified as primarily silty sand.

This sediment quality evaluation was completed by Mr. Mark D. Siipola, of the Coastal and Flood Plain Management Branch, Planning Division, USACE Portland District.

ATTACHMENT 1

Gifford Pinchot
National Forest
(AREA NOT INCLUDED)

BERGE
RESERVOIR
24

ZONE A

St Martins
Hot Springs

Cemetery

SPRINGS

Cursor

HOT

WIND RIVER ROAD

8C

21

22

23

WIND RIVER

Little
Wind
River

27

26

25

38

29

28

(14)

RAILROAD

Home Valley

RIVER

10

(14)

35

36

LEWIS AND CLARK HIGHWAY

ZONE A

HOME
LAKE

GIRL SC
ROAD

SKAMANIA COUNTY WASHINGTON
HOOD RIVER COUNTY OREGON

ATTACHMENT 2



DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION MATERIALS LABORATORY
CORPS OF ENGINEERS

1491 NW Graham Avenue
TROUTDALE, OREGON 97060 -9503

CENPD-EN-G-L (1110-1-8100c)

JUN 27 1989

MEMORANDUM FOR: Commander, Portland District, ATTN: CENPP-PL-CH

SUBJECT: W.O.#89-SHM-716, Report of Sediment Test Results

Project: WIND RIVER
Intended Use: --
Source of Material: Wind River
Submitted by: CENPP-PL-CH (Siipola)
Date Sampled: -- Date Received: 14 Jun 89
Method of Test or Specification: ASTM. EM1110-2-1906
Reference: a) DA Form 2544, Order No. E86-89-0069, Change Order No. R-1,
b) NPD Form 300, Sample Transmittal, dated 14 Jun 89, covering
the samples tested,
c) Our report, this subject, dated 19 Jun 89.


1. Enclosed are:

a. Enclosure 1, one summary sheet, "Results of Physical Analyses of Sediment," with results for the three samples tested.

b. Enclosure 2, three gradation analysis summary sheets.

2. This completes all work to date.

Encls


JAMES PAXTON
Director

Copy Furnished: CENPD-EN-G

WIND RIVER

Results of Dredge Test Analysis

| <u>CENPP Sample Number</u> | <u>Resuspended Density, gms/L</u> | <u>Void Ratio</u> | <u>Volatile Solids, %</u> | <u>Specific Gravity</u> | <u>Roundness Grading</u> |
|--------------------------------|---------------------------------------|-------------------|-------------------------------|-----------------------------|--------------------------|
| WR-C-1 | 1550 | 2.087 | 6.3 | 2.70 | subangular to subround |
| WR-C-2 | 1512 | 2.303 | 5.9 | 2.69 | subangular to subround |
| WR-S-1 | 1378 | 3.241 | 10.6 | 2.60 | subangular to subround |

*** Corps of Engineers - North Pacific Division Materials Laboratory ***

WIND RIVER SEDIMENTS (89-SHM-716)

Boring: --- Sample: WR-C-1 Depth: --- Lab No.: 71645

| Sieve Analysis | | | Hydrometer Analysis | | | | |
|----------------|---------------------------|-----------------|-------------------------|----------|--------------------|------------------|---------------|
| Sieve | Cumulative Grams Retained | Percent Passing | Sample Weight: 84.7 gr. | Temp (C) | Hydrometer Reading | Start Time: 0000 | Percent Finer |
| 5 In. | 0.00 | 100.0 | 1 | 20.0 | 17.0 | 0.0493 | 20.5 |
| 2.5 In. | 0.00 | 100.0 | 3 | 20.0 | 12.0 | 0.0293 | 14.6 |
| 1.25 In. | 0.00 | 100.0 | 10 | 20.0 | 9.0 | 0.0163 | 11.1 |
| 5/8 In. | 0.00 | 100.0 | 100 | 20.0 | 5.0 | 0.0068 | 6.4 |
| 5/16 In. | 0.00 | 100.0 | 200 | 20.0 | 3.0 | 0.0049 | 4.1 |
| No. 5 | 0.00 | 100.0 | | | | | |
| No. 10 | 0.00 | 100.0 | | | | | |
| Pan | 84.70 | 0.0 | | | | | |
| No. 18 | 0.00 | 100.0 | | | | | |
| No. 35 | 0.40 | 99.5 | | | | | |
| No. 60 | 7.40 | 91.3 | | | | | |
| No. 120 | 37.20 | 56.1 | | | | | |
| No. 230 | 64.90 | 23.4 | | | | | |
| Pan | 84.70 | 0.0 | | | | | |

D85: 0.22 D60: 0.13 D50: 0.11 D30: .075 D15: .030 D10: .013 mm
Cu: 10.2 Cc: 3.22

Estimated fines type used in place of Atterberg limits.

Fines Type Used for Classification: ML, SILT

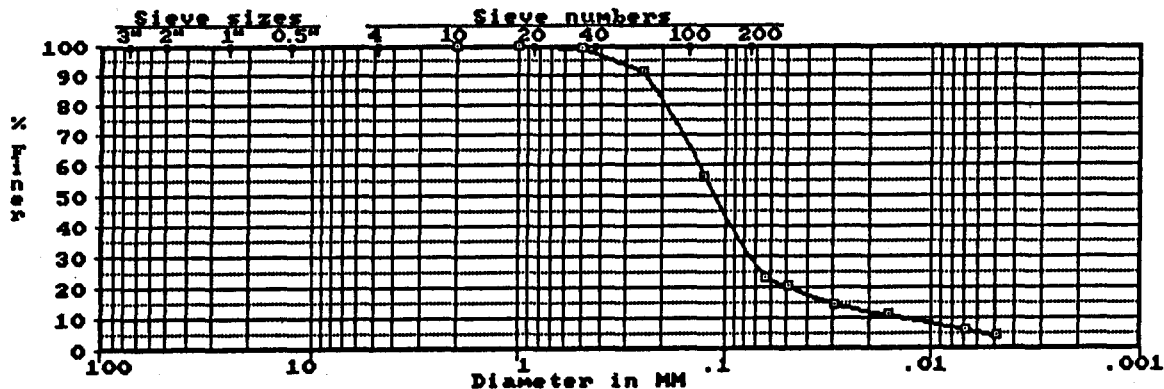
Gravel: 0.0%

Sand: 70.1%

Fines: 29.9%

ASTM D 2487 Classification

SM Silty SAND



WIND RIVER SEDIMENTS (89-SHM-716)

Boring: --- Sample: WR-C-2 Depth: --- Lab No.: 71646

| Sieve Analysis | | | Hydrometer Analysis | | | | |
|----------------|----------------|-----------------|--|----------|--------------------|----------------|---------------|
| Cumulative | | | Sample Weight: 85.5 gr. Start Time: 0000 | | | | |
| Sieve | Grams Retained | Percent Passing | Time | Temp (C) | Hydrometer Reading | Diameter in mm | Percent Finer |
| 5 In. | 0.00 | 100.0 | 1 | 20.0 | 15.5 | 0.0497 | 18.3 |
| 2.5 In. | 0.00 | 100.0 | 3 | 20.0 | 11.5 | 0.0294 | 13.7 |
| 1.25 In. | 0.00 | 100.0 | 10 | 20.0 | 8.5 | 0.0164 | 10.3 |
| 5/8 In. | 0.00 | 100.0 | 100 | 20.0 | 5.0 | 0.0068 | 6.3 |
| 5/16 In. | 6.40 | 99.1 | 200 | 20.0 | 4.0 | 0.0048 | 5.1 |
| No. 5 | 8.60 | 98.7 | | | | | |
| No. 10 | 8.60 | 98.7 | | | | | |
| Pan | 684.20 | 0.0 | | | | | |
| No. 18 | 0.20 | 98.5 | | | | | |
| No. 35 | 2.30 | 96.1 | | | | | |
| No. 60 | 21.90 | 73.5 | | | | | |
| No. 120 | 53.20 | 37.3 | | | | | |
| No. 230 | 68.10 | 20.1 | | | | | |
| Pan | 85.50 | 0.0 | | | | | |

D85: 0.33 D60: 0.19 D50: 0.16 D30: 0.10 D15: .034 D10: .015 mm
Cu: 12.6 Cc: 3.40

Estimated fines type used in place of Atterberg limits.

Fines Type Used for Classification: ML, SILT

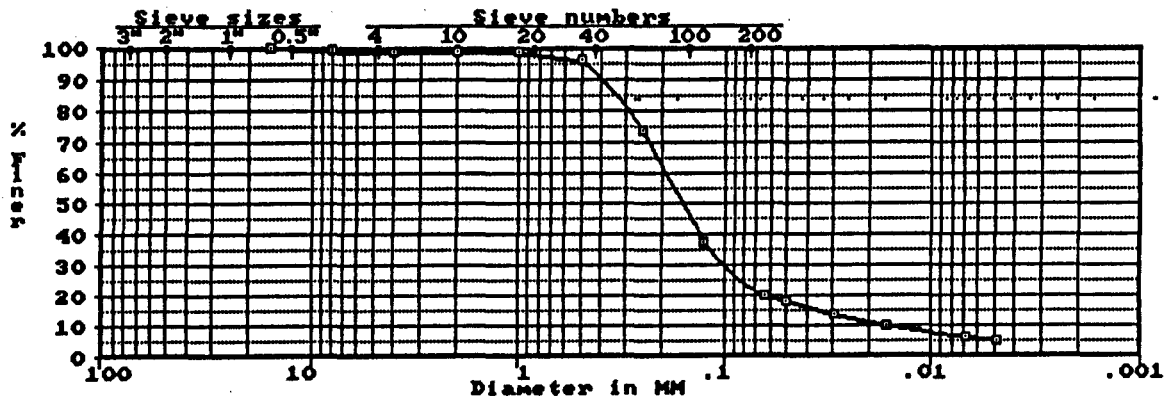
Gravel: 1.2%

Sand: 76.0%

Fines: 22.8%

ASTM D 2487 Classification

SM Silty SAND



*** Corps of Engineers - North Pacific Division Materials Laboratory ***

WIND RIVER SEDIMENTS (89-SHM-716)

Boring: --- Sample: WR-S-1 Depth: --- Lab No.: 71647

| Sieve Analysis | | | Hydrometer Analysis | | | | |
|----------------|----------------|-----------------|-------------------------|----------|--------------------|----------------|---------------|
| Cumulative | | | Sample Weight: 60.9 gr. | | Start Time: 0000 | | |
| Sieve | Grams Retained | Percent Passing | Time | Temp (C) | Hydrometer Reading | Diameter in mm | Percent Finer |
| 5 In. | 0.00 | 100.0 | 1 | 20.0 | 17.0 | 0.0493 | 28.4 |
| 2.5 In. | 0.00 | 100.0 | 3 | 20.0 | 9.5 | 0.0297 | 16.3 |
| 1.25 In. | 0.00 | 100.0 | 10 | 20.0 | 5.5 | 0.0166 | 9.8 |
| 5/8 In. | 0.00 | 100.0 | 100 | 20.0 | 2.5 | 0.0069 | 4.9 |
| 5/16 In. | 0.00 | 100.0 | 200 | 20.0 | 2.0 | 0.0049 | 4.1 |
| No. 5 | 0.00 | 100.0 | | | | | |
| No. 10 | 0.00 | 100.0 | | | | | |
| Pan | 60.90 | 0.0 | | | | | |
| No. 18 | 0.10 | 99.8 | | | | | |
| No. 35 | 0.80 | 98.7 | | | | | |
| No. 60 | 3.60 | 94.1 | | | | | |
| No. 120 | 19.00 | 68.8 | | | | | |
| No. 230 | 40.60 | 33.3 | | | | | |
| Pan | 60.90 | 0.0 | | | | | |

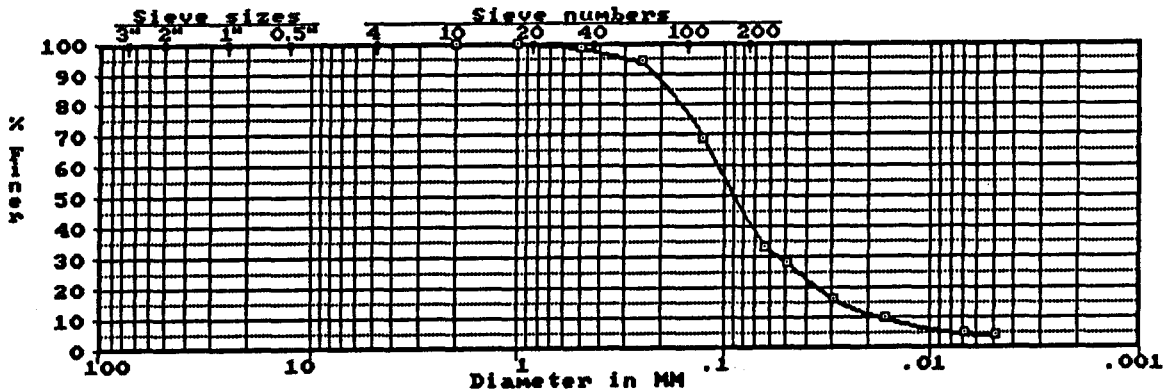
D85: 0.18 D60: 0.11 D50: .089 D30: .054 D15: .027 D10: .017 mm
Cu: 6.28 Cc: 1.58

Estimated fines type used in place of Atterberg limits.
Fines Type Used for Classification: ML, SILT

Gravel: 0.0% Sand: 58.7% Fines: 41.3%

ASTM D 2487 Classification

SM Silty SAND



ATTACHMENT 3



DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION MATERIALS LABORATORY
CORPS OF ENGINEERS
1491 NW Graham Avenue
TROUTDALE, OREGON 97060-9503

AUG 11 1989

CENPD-EN-G-L (1110-1-8100c)

MEMORANDUM FOR: Commander, Portland District, ATTN: CENPP-PL-CH

SUBJECT: W.O.#89-SH-819, Results of Chemical Analyses

Project: WIND RIVER
Intended Use: Evaluate condition of site
Source of Material: Above site
Submitted by: CENPP-PL-CH
Date Sampled: 14 Jun 89 Dated Received: 14 Jun 89
Method of Test or Specification: See Test Methods sheet
Reference: DA Form 2544 in progress.

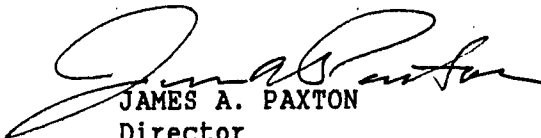
1. Enclosed are results of analyses performed on three sediment samples from the above site. Included are:

a. Enclosure 1, results of analyses by CENPD-EN-G-L.

b. Enclosure 2, Report No. 891239, with results of analyses from Columbia Analytical Services, Inc.

2. This completes all work requested to date.

Enclosures


JAMES A. PAXTON
Director

Copies Furnished: CENPD-EN-G

WIND RIVER

Results of Dredge Test Analysis

| <u>CENPP Sample Number</u> | <u>Resuspended Density, gms/L</u> | <u>Void Ratio</u> | <u>Volatile Solids, %</u> | <u>Specific Gravity</u> | <u>Roundness Grading</u> |
|--------------------------------|---------------------------------------|-------------------|-------------------------------|-----------------------------|--------------------------|
| WR-C-1 | 1550 | 2.087 | 6.3 | 2.70 | subangular to subround |
| WR-C-2 | 1512 | 2.303 | 5.9 | 2.69 | subangular to subround |
| WR-S-1 | 1378 | 3.241 | 10.6 | 2.60 | subangular to subround |

*** Corps of Engineers - North Pacific Division Materials Laboratory ***

WIND RIVER SEDIMENTS (89-SHM-716)

Boring: --- Sample: WR-G-1 Depth: --- Lab No.: 71645

| Sieve Analysis | | | Hydrometer Analysis | | | | |
|----------------|----------------|-----------------|--|----------|--------------------|----------------|---------------|
| Cumulative | | | Sample Weight: 84.7 gr. Start Time: 0000 | | | | |
| Sieve | Grams Retained | Percent Passing | Time | Temp (C) | Hydrometer Reading | Diameter in mm | Percent Finer |
| 5 In. | 0.00 | 100.0 | 1 | 20.0 | 17.0 | 0.0493 | 20.5 |
| 2.5 In. | 0.00 | 100.0 | 3 | 20.0 | 12.0 | 0.0293 | 14.6 |
| 1.25 In. | 0.00 | 100.0 | 10 | 20.0 | 9.0 | 0.0163 | 11.1 |
| 5/8 In. | 0.00 | 100.0 | 100 | 20.0 | 5.0 | 0.0068 | 6.4 |
| 5/16 In. | 0.00 | 100.0 | 200 | 20.0 | 3.0 | 0.0049 | 4.1 |
| No. 5 | 0.00 | 100.0 | | | | | |
| No. 10 | 0.00 | 100.0 | | | | | |
| Pan | 84.70 | 0.0 | | | | | |
| No. 18 | 0.00 | 100.0 | | | | | |
| No. 35 | 0.40 | 99.5 | | | | | |
| No. 60 | 7.40 | 91.3 | | | | | |
| No. 120 | 37.20 | 56.1 | | | | | |
| No. 230 | 64.90 | 23.4 | | | | | |
| Pan | 84.70 | 0.0 | | | | | |

D85: 0.22 D60: 0.13 D50: 0.11 D30: .075 D15: .030 D10: .013 mm
Cu: 10.2 Cc: 3.22

Estimated fines type used in place of Atterberg limits.

Fines Type Used for Classification: ML, SILT

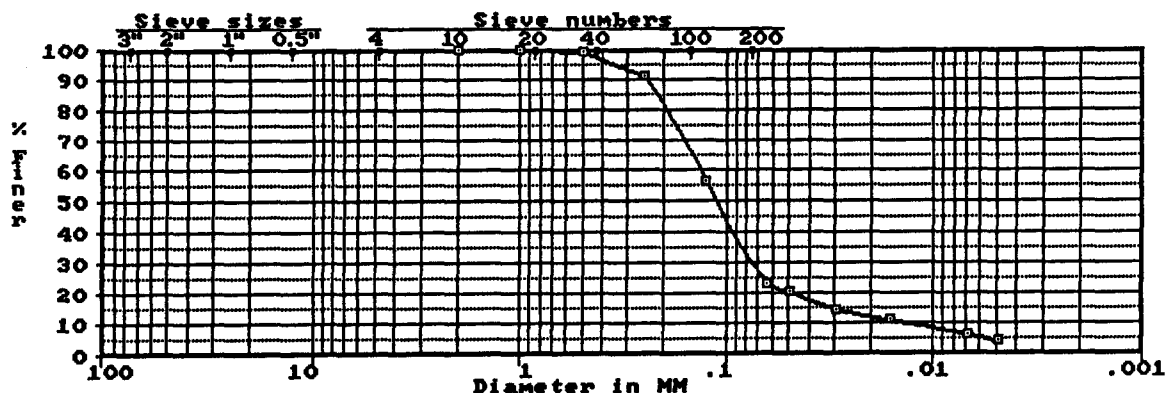
Gravel: 0.0%

Sand: 70.1%

Fines: 29.9%

ASTM D 2487 Classification

SM Silty SAND



* * * Corps of Engineers - North Pacific Division Materials Laboratory * * *

WIND RIVER SEDIMENTS (89-SHM-716)

Boring: --- Sample: WR-C-2 Depth: --- Lab No.: 71646

| Sieve Analysis | | | Hydrometer Analysis | | | | |
|----------------|----------------|-----------------|---------------------|----------|--------------------|----------------|---------------|
| Cumulative | | | Sample Weight: | 85.5 gr. | Start Time: | 0000 | |
| Sieve | Grams Retained | Percent Passing | Time | Temp (C) | Hydrometer Reading | Diameter in mm | Percent Finer |
| 5 In. | 0.00 | 100.0 | 1 | 20.0 | 15.5 | 0.0497 | 18.3 |
| 2.5 In. | 0.00 | 100.0 | 3 | 20.0 | 11.5 | 0.0294 | 13.7 |
| 1.25 In. | 0.00 | 100.0 | 10 | 20.0 | 8.5 | 0.0164 | 10.3 |
| 5/8 In. | 0.00 | 100.0 | 100 | 20.0 | 5.0 | 0.0068 | 6.3 |
| 5/16 In. | 6.40 | 99.1 | 200 | 20.0 | 4.0 | 0.0048 | 5.1 |
| No. 5 | 8.60 | 98.7 | | | | | |
| No. 10 | 8.60 | 98.7 | | | | | |
| Pan | 684.20 | 0.0 | | | | | |
| No. 18 | 0.20 | 98.5 | | | | | |
| No. 35 | 2.30 | 96.1 | | | | | |
| No. 60 | 21.90 | 73.5 | | | | | |
| No. 120 | 53.20 | 37.3 | | | | | |
| No. 230 | 68.10 | 20.1 | | | | | |
| Pan | 85.50 | 0.0 | | | | | |

D85: 0.33 D60: 0.19 D50: 0.16 D30: 0.10 D15: .034 D10: .015 mm
Cu: 12.6 Cc: 3.40

Estimated fines type used in place of Atterberg limits.

Fines Type Used for Classification: ML, SILT

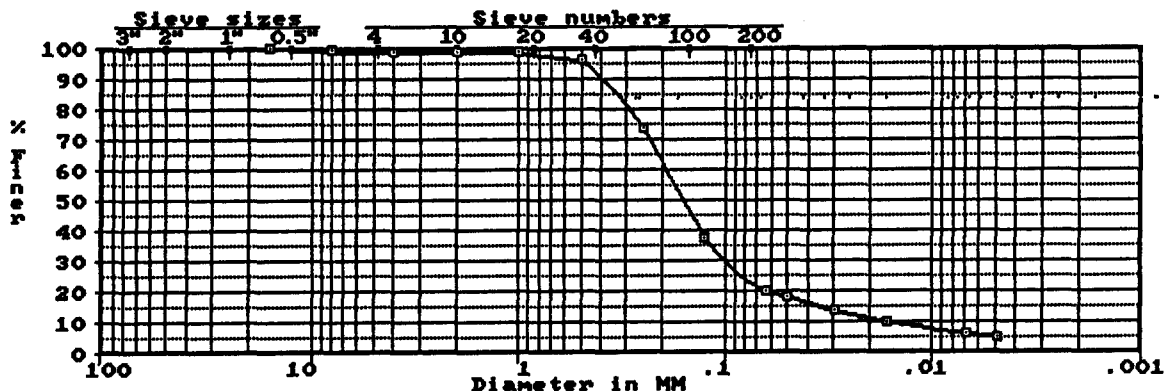
Gravel: 1.2%

Sand: 76.0%

Fines: 22.8%

----- ASTM D 2487 Classification -----

SM Silty SAND



*** Corps of Engineers - North Pacific Division Materials Laboratory ***

WIND RIVER SEDIMENTS (89-SHM-716)

Boring: --- Sample: WR-S-1 Depth: --- Lab No.: 71647

| Sieve Analysis | | | Hydrometer Analysis | | | | |
|----------------|----------------|-----------------|-------------------------|----------|--------------------|----------------|---------------|
| Cumulative | | | Sample Weight: 60.9 gr. | | Start Time: 0000 | | |
| Sieve | Grams Retained | Percent Passing | Time | Temp (C) | Hydrometer Reading | Diameter in mm | Percent Finer |
| 5 In. | 0.00 | 100.0 | 1 | 20.0 | 17.0 | 0.0493 | 28.4 |
| 2.5 In. | 0.00 | 100.0 | 3 | 20.0 | 9.5 | 0.0297 | 16.3 |
| 1.25 In. | 0.00 | 100.0 | 10 | 20.0 | 5.5 | 0.0166 | 9.8 |
| 5/8 In. | 0.00 | 100.0 | 100 | 20.0 | 2.5 | 0.0069 | 4.9 |
| 5/16 In. | 0.00 | 100.0 | 200 | 20.0 | 2.0 | 0.0049 | 4.1 |
| No. 5 | 0.00 | 100.0 | | | | | |
| No. 10 | 0.00 | 100.0 | | | | | |
| Pan | 60.90 | 0.0 | | | | | |
| No. 18 | 0.10 | 99.8 | | | | | |
| No. 35 | 0.80 | 98.7 | | | | | |
| No. 60 | 3.60 | 94.1 | | | | | |
| No. 120 | 19.00 | 68.8 | | | | | |
| No. 230 | 40.60 | 33.3 | | | | | |
| Pan | 60.90 | 0.0 | | | | | |

D85: 0.18 D60: 0.11 D50: .089 D30: .054 D15: .027 D10: .017 mm
Cu: 6.28 Cc: 1.58

Estimated fines type used in place of Atterberg limits.

Fines Type Used for Classification: ML, SILT

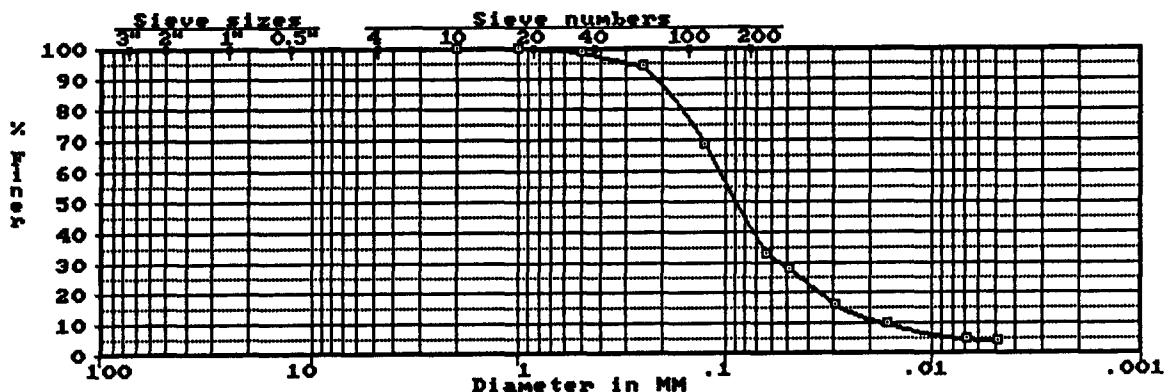
Gravel: 0.0%

Sand: 58.7%

Fines: 41.3%

ASTM D 2487 Classification

SM Silty SAND



WIND RIVER

Metals Analyses

Sample Identification: WR-C-1 Matrix: sediment Solids, %: 66.3
Collected: 14 Jun 89 Received: 14 Jun 89 3050 Digestion: 19 Jun 89
AA Analysis: 20 Jun-3 Aug 89 Reporting Units: mg/Kg (ppm), dry wgt. basis
Comments: Silty sand, minor organics.

| <u>Metal</u> | <u>Result</u> | <u>Required Detection Limit</u> |
|--------------|---------------|-------------------------------------|
| arsenic | 19.1 | 1.0 |
| cadmium | <0.1 | 0.1 |
| chromium | 10.0 | 1.0 |
| copper | 40.5 | 1.0 |
| lead | 5.7 | 1.0 |
| mercury | <0.02 | 0.02 |
| nickel | 20.3 | 1.0 |
| zinc | 93.4 | 1.0 |

WIND RIVER

Metals Analyses

Sample Identification: WR-C-2 Matrix: sediment Solids, %: 63.6
Collected: 14 Jun 89 Received: 14 Jun 89 3050 Digestion: 19 Jun 89
AA Analysis: 20 Jun-3 Aug 89 Reporting Units: mg/Kg (ppm), dry wgt. basis
Comments: Silty silt, minor organics.

| <u>Metal</u> | <u>Result</u> | <u>Required Detection Limit</u> |
|--------------|---------------|-------------------------------------|
| arsenic | 18.0 | 1.0 |
| cadmium | <0.1 | 0.1 |
| chromium | 9.0 | 1.0 |
| copper | 32.0 | 1.0 |
| lead | 4.9 | 1.0 |
| mercury | <0.02 | 0.02 |
| nickel | 15.0 | 1.0 |
| zinc | 34.0 | 1.0 |

WIND RIVER

Metals Analyses

Sample Identification: WR-S-1 Matrix: sediment Solids, %: 50.7
Collected: 14 Jun 89 Received: 14 Jun 89 3050 Digestion: 19 Jun 89
AA Analysis: 20 Jun-3 Aug 89 Reporting Units: mg/Kg (ppm), dry wgt. basis
Comments: Silty silt, minor organics.

| <u>Metal</u> | <u>Result</u> | <u>Required Detection Limit</u> |
|--------------|---------------|-------------------------------------|
| arsenic | 24.1 | 1.0 |
| cadmium | <0.1 | 0.1 |
| chromium | 9.9 | 1.0 |
| copper | 41.0 | 1.0 |
| lead | 5.8 | 1.0 |
| mercury | <0.02 | 0.02 |
| nickel | 16.3 | 1.0 |
| zinc | 55.0 | 1.0 |

WIND RIVER

Organochlorine Pesticides and PCB's

Sample Identification: WR-C-1 Percent Solids: 66.3
Reporting Units: ug/Kg (ppb), dry weight Sample Matrix: sediment
Collected: 14 Jun 89 GC Analysis: 28 Jun-5 Jul 89 Extracted: 21 Jun 89

| Analyte | Result | Detection Limit |
|--------------------|--------|-----------------|
| Aldrin | <5.0 | 5.0 |
| alpha-BHC | <5.0 | 5.0 |
| beta-BHC | <5.0 | 5.0 |
| gamma-BHC | <5.0 | 5.0 |
| delta-BHC | <5.0 | 5.0 |
| Chlordane | <5.0 | 5.0 |
| 4,4'-DDD | <5.0 | 5.0 |
| 4,4'-DDE | <10.0 | 10.0 |
| 4,4'-DDT | <5.0 | 5.0 |
| Dieldrin | <10.0 | 10.0 |
| Endosulfan I | <5.0 | 5.0 |
| Endosulfan II | <5.0 | 5.0 |
| Endosulfan sulfate | <5.0 | 5.0 |
| Endrin | <5.0 | 5.0 |
| Endrin aldehyde | <5.0 | 5.0 |
| Heptachlor | <5.0 | 5.0 |
| Heptachlor epoxide | <5.0 | 5.0 |
| Methoxychlor | <15.0 | 15.0 |
| Toxaphene | <100 | 100 |
| Aroclor-1016 | <80.0 | 80.0 |
| Aroclor-1221 | <80.0 | 80.0 |
| Aroclor-1232 | <80.0 | 80.0 |
| Aroclor-1242 | <80.0 | 80.0 |
| Aroclor-1248 | <80.0 | 80.0 |
| Aroclor-1254 | <80.0 | 80.0 |
| Aroclor-1260 | <80.0 | 80.0 |

METHODS: "Test Methods for Evaluating Solid Waste", SW-846, 3rd Edition,
U.S. EPA, November 1986:

Method 3540, Soxhlet Extraction

Method 3660, Sulfur Cleanup

Method 8080, Organochlorine Pesticides and PCB's

WIND RIVER

Organochlorine Pesticides and PCB's

Sample Identification: WR-C-2 Percent Solids: 63.6
Reporting Units: ug/Kg (ppb), dry weight Sample Matrix: sediment
Collected: 14 Jun 89 GC Analysis: 28 Jun-5 Jul 89 Extracted: 21 Jun 89

| <u>Analyte</u> | <u>Result</u> | <u>Detection Limit</u> |
|--------------------|---------------|------------------------|
| Aldrin | <5.0 | 5.0 |
| alpha-BHC | <5.0 | 5.0 |
| beta-BHC | <5.0 | 5.0 |
| gamma-BHC | <5.0 | 5.0 |
| delta-BHC | <5.0 | 5.0 |
| Chlordane | <5.0 | 5.0 |
| 4,4'-DDD | <5.0 | 5.0 |
| 4,4'-DDE | <10.0 | 10.0 |
| 4,4'-DDT | <5.0 | 5.0 |
| Dieldrin | <10.0 | 10.0 |
| Endosulfan I | <5.0 | 5.0 |
| Endosulfan II | <5.0 | 5.0 |
| Endosulfan sulfate | <5.0 | 5.0 |
| Endrin | <5.0 | 5.0 |
| Endrin aldehyde | <5.0 | 5.0 |
| Heptachlor | <5.0 | 5.0 |
| Heptachlor epoxide | <5.0 | 5.0 |
| Methoxychlor | <15.0 | 15.0 |
| Toxaphene | <100 | 100 |
| Aroclor-1016 | <80.0 | 80.0 |
| Aroclor-1221 | <80.0 | 80.0 |
| Aroclor-1232 | <80.0 | 80.0 |
| Aroclor-1242 | <80.0 | 80.0 |
| Aroclor-1248 | <80.0 | 80.0 |
| Aroclor-1254 | <80.0 | 80.0 |
| Aroclor-1260 | <80.0 | 80.0 |

METHODS: "Test Methods for Evaluating Solid Waste", SW-846, 3rd Edition,
U.S. EPA, November 1986:

Method 3540, Soxhlet Extraction

Method 3660, Sulfur Cleanup

Method 8080, Organochlorine Pesticides and PCB's

WIND RIVER

Organochlorine Pesticides and PCB's

Sample Identification: WR-S-1 Percent Solids: 50.7
Reporting Units: ug/Kg (ppb), dry weight Sample Matrix: sediment
Collected: 14 Jun 89 GC Analysis: 28 Jun-5 Jul 89 Extracted: 21 Jun 89

| Analyte | Result | Detection Limit |
|--------------------|--------|-----------------|
| Aldrin | <5.0 | 5.0 |
| alpha-BHC | <5.0 | 5.0 |
| beta-BHC | <5.0 | 5.0 |
| gamma-BHC | <5.0 | 5.0 |
| delta-BHC | <5.0 | 5.0 |
| Chlordane | <5.0 | 5.0 |
| 4,4'-DDD | <5.0 | 5.0 |
| 4,4'-DDE | <10.0 | 10.0 |
| 4,4'-DDT | <5.0 | 5.0 |
| Dieldrin | <10.0 | 10.0 |
| Endosulfan I | <5.0 | 5.0 |
| Endosulfan II | <5.0 | 5.0 |
| Endosulfan sulfate | <5.0 | 5.0 |
| Endrin | <5.0 | 5.0 |
| Endrin aldehyde | <5.0 | 5.0 |
| Heptachlor | <5.0 | 5.0 |
| Heptachlor epoxide | <5.0 | 5.0 |
| Methoxychlor | <15.0 | 15.0 |
| Toxaphene | <100 | 100 |
| Aroclor-1016 | <80.0 | 80.0 |
| Aroclor-1221 | <80.0 | 80.0 |
| Aroclor-1232 | <80.0 | 80.0 |
| Aroclor-1242 | <80.0 | 80.0 |
| Aroclor-1248 | <80.0 | 80.0 |
| Aroclor-1254 | <80.0 | 80.0 |
| Aroclor-1260 | <80.0 | 80.0 |

METHODS: "Test Methods for Evaluating Solid Waste", SW-846, 3rd Edition,
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Method 3540, Soxhlet Extraction

Method 3660, Sulfur Cleanup

Method 8080, Organochlorine Pesticides and PCB's

CENPD-EN-G-L

Laboratory Quality Control

WIND RIVER
Organochlorine Pesticides and PCB's
Process Blank

Reporting Units: ug/Kg (ppb)Comments: Results calculated for sample size of 10 grams

| <u>Analyte</u> | <u>Result</u> | <u>Detection Limit</u> |
|--------------------|---------------|------------------------|
| Aldrin | <5.0 | 5.0 |
| alpha-BHC | <5.0 | 5.0 |
| beta-BHC | <5.0 | 5.0 |
| gamma-BHC | <5.0 | 5.0 |
| delta-BHC | <5.0 | 5.0 |
| Chlordane | <5.0 | 5.0 |
| 4,4'-DDD | <5.0 | 5.0 |
| 4,4'-DDE | <10.0 | 10.0 |
| 4,4'-DDT | <5.0 | 5.0 |
| Dieldrin | <10.0 | 10.0 |
| Endosulfan I | <5.0 | 5.0 |
| Endosulfan II | <5.0 | 5.0 |
| Endosulfan sulfate | <5.0 | 5.0 |
| Endrin | <5.0 | 5.0 |
| Endrin aldehyde | <5.0 | 5.0 |
| Heptachlor | <5.0 | 5.0 |
| Heptachlor epoxide | <5.0 | 5.0 |
| Methoxychlor | <15.0 | 15.0 |
| Toxaphene | <100 | 100 |
| Aroclor-1016 | <80.0 | 80.0 |
| Aroclor-1221 | <80.0 | 80.0 |
| Aroclor-1232 | <80.0 | 80.0 |
| Aroclor-1242 | <80.0 | 80.0 |
| Aroclor-1248 | <80.0 | 80.0 |
| Aroclor-1254 | <80.0 | 80.0 |
| Aroclor-1260 | <80.0 | 80.0 |

WIND RIVER
Organochlorine Pesticides and PCB's
Matrix Spike Results

Sample Identification: WR-C-1 Reporting Units: ug/Kg (ppb), dry weight

| <u>Analyte</u> | <u>Spike Added</u> | <u>Spike Result</u> | <u>Sample Result</u> | <u>Percent Recovered</u> |
|----------------|------------------------|-------------------------|--------------------------|------------------------------|
| Aroclor-1260 | 357 | 330 | <80.0 | 92.4 |
| alpha-BHC | 35.7 | 38.6 | <5.0 | 108 |
| gamma-BHC | 35.7 | 34.3 | <5.0 | 96.1 |

WIND RIVER

Metals Analyses
Quality Control
Duplicate Analyses

Sample Identification: WR-C-1 Matrix: sediment
Reporting Units: mg/Kg (ppb), dry wgt. basis
Comments: Silty sand, minor organics.

| <u>Metal</u> | <u>Sample Result (SR)</u> | <u>Duplicate Result (DR)</u> | <u>Relative Difference, %</u> |
|--------------|-------------------------------|----------------------------------|-----------------------------------|
| arsenic | 18.1 | 20.0 | 10 |
| cadmium | <0.1 | <0.1 | NC |
| chromium | 10.0 | 10.0 | 0 |
| copper | 41.0 | 40.0 | 2 |
| lead | 5.6 | 5.8 | 4 |
| mercury | <0.02 | <0.02 | NC |
| nickel | 20.5 | 20.0 | 2 |
| zinc | 110.0 | 76.8 | 36 |

Relative Difference, % = $(SR - DR) / [(SR + DR)/2]$

NC = Not calculated, since one or both values are below the required detection limit.

WIND RIVER

Metals Analyses
Quality Control
Process Blank

Matrix: sediment Reporting Units: mg/Kg

| <u>Metal</u> | <u>Result</u> | <u>Required Detection Limit</u> |
|--------------|---------------|-------------------------------------|
| arsenic | <1.0 | 1.0 |
| cadmium | <0.1 | 0.1 |
| chromium | <1.0 | 1.0 |
| copper | <1.0 | 1.0 |
| lead | <1.0 | 1.0 |
| mercury | <0.2 | 0.2 |
| nickel | <1.0 | 1.0 |
| zinc | <1.0 | 1.0 |

WIND RIVER

Metals Analyses
Quality Control
Analyses of Reference Material
(Laboratory Control Sample)

Reporting Units: ug/L (ppb)

| <u>Metal</u> | <u>USEPA QC Sample</u> | <u>True Value</u> | <u>Found</u> | <u>Recovered, %</u> |
|--------------|----------------------------|-----------------------|--------------|---------------------|
| arsenic | (WP 287)/2 | 50 | 50.7 | 101 |
| cadmium | (WP 287)/5 | 5 | 4.8 | 96 |
| chromium | (WP 287)/5 | 20 | 20.4 | 102 |
| copper | (WP 287)/4 | 25 | 26.7 | 107 |
| lead | (WP 287)/2 | 50 | 47.9 | 96 |
| mercury | (WP 287)/2 | 2.5 | 2.7 | 108 |
| nickel | (WP 287)/5 | 20 | 17.5 | 88 |
| zinc | WP-11* | 10.0 | 10.0 | 100 |

* Commercial standard

WIND RIVER

Test Methods

USEPA, "Test Methods for Evaluating Solid Waste," Third Edition, November 1986:

| | |
|-----------------------|---|
| Method 7060, arsenic | : atomic absorption, furnace |
| Method 7131, cadmium | : atomic absorption, furnace |
| Method 7191, chromium | : atomic absorption, furnace |
| Method 7210, copper | : atomic absorption, flame |
| Method 7421, lead | : atomic absorption, furnace |
| Method 7470, mercury | : atomic absorption, manual cold vapor |
| Method 7520, nickel | : atomic absorption, flame |
| Method 7950, zinc | : atomic absorption, flame |

Custody Information

CHAIN OF CUSTODY RECORD

[illegible]

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

CLIENT: U.S. Army Corps of Engineers
SUBMITTED BY: Mr. Jim Paxton
PROJECT: Wind River
SAMPLE DESCRIPTION: Soil

DATE RECEIVED: 06/16/89
DATE ANALYZED: 06/30/89
WORK ORDER #: 891239

Total Organic Carbon (TOC)
EPA Method 415.1
%
Dry Weight Basis

| Sample Name | Lab Code | % TOC |
|-------------|----------|-------|
| WR-C-1 | 1239-1 | 1.5 |
| WR-C-2 | 1239-2 | 2.1 |
| WR-S-1 | 1239-3 | 3.5 |

Approved by Dave Edelman Date 6/28/89

Enclosure 2

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

CLIENT: U.S. Army Corps of Engineers
SUBMITTED BY: Mr. Jim Paxton
PROJECT: Wind River
SAMPLE DESCRIPTION: Soil

DATE COLLECTED: 06/14/89
DATE RECEIVED: 06/16/89
DATE ANALYZED: 06/30/89
WORK ORDER #: 891239

Solids Total
EPA Method 160.3
% As Received Basis

| Sample Name | Lab Code | Result |
|-------------|----------|--------|
| WR-C-1 | 1239-1 | 61.4 |
| WR-C-2 | 1239-2 | 62.2 |
| WR-S-1 | 1239-3 | 50.0 |

Approved by Dave Edelman Date 6/28/89

APPENDIX A
LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

CLIENT: Environmental Protection Agency
SUBMITTED BY: Jim Paxton
PROJECT: Wind River
SAMPLE DESCRIPTION: Water

DATE COLLECTED: 06/13/89
DATE RECEIVED: 06/16/89
WORK ORDER #: 891239

QA/QC Report
TOC
EPA Method 415.1
% Dry Weight Basis

CALIBRATION
VERIFICATION STANDARD

True
Value

Measured
Value

%
Recovery

20

19.8

99

LABORATORY BLANK

Detection
Limit

Blank
Value

1

ND

ND means None Detected

Approved by David Edelmann, J.

Date 6/28/89

APPENDIX B
CHAIN OF CUSTODY INFORMATION

[illegible]